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MATCH CHARACTERISTICS AND TAEKWONDO INJURIES

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INTRODUCTION

An increase in epidemiological studies on taekwondo injuries has occurred in the past decade. Some of these investigations have focused on taekwondo injuries in general [2, 10], while others have highlighted specific areas of concern, such as time-loss injuries in young and adult taekwondo athletes [5, 8] as well as cerebral concussions [4].

Since taekwondo competition typically involves several 2- or 3-round bouts, it stands to reason to hypothesize that injuries may increase as more bouts are fought. For instance, in American football, research seems to suggest that more injuries occur after the first two quarters, possibly due to a combination of lack of warm-up after the break and onset of fatigue [9]. Fatigue has been suggested by others as well to be one of the risk factors for injuries [7]. No studies were found investigating the relationship between number of matches and injury occurrence in martial arts in general and taekwondo in particular. The purpose of this study, therefore, was to assess taekwondo competition injuries as a function of number of matches fought.

METHODS

Subjects were 2739 young and adult males and females participating in the national championships of the Hellenic Federation of Taekwondo in the 1994–1995 seasons. The adult men and women were aged 18 years and older, while the junior boys and girls were 14–17 years old and the boys and girls were 11–13 years.

Project staff collected injury data with all diagnoses made by the tournament physician. A form was completed for every injury for which treatment was sought from the medical staff at the competition site. An injury was defined as any circumstance for which assistance was sought from the medical personnel. Each bout lasted 3 rounds of 3 minutes with a 1-minute break in between rounds.

Exposure data for calculating injury rates were gathered from records of bouts actually fought. Injury rates were calculated as (number of injuries/number of athlete-exposures) × 1,000 = number of injuries per 1,000 athlete-exposures (A-E). Mann-Whitney U, Kruskal-Wallis and Chi-squared tests were used to determine the differences in injury rates between gender and age groups. All analyses were conducted with $p<0.05$.

RESULTS

Tables 1 and 2 display the total injury profile of young and adult taekwondo athletes. In the adult males, there was a difference in the distribution of injuries per match, with most injuries occurring in the first match ($p=0.018$). No difference was found in the adult females.

Table 1. Distribution of injury frequency by match in Greek taekwondo athletes

Match	Men	Women	Jr. Boys	Jr. Girls	Boys	Girls
First	11	5	18	14	14	11
Second	1	3	14	8	10	8
Third	5	4	7	4	5	3
Fourth	4	3	4	2	4	2
Total	21	15	43	28	33	24

Table 2. Distribution of injury rates per 1,000 athlete-exposures by match in Greek taekwondo athletes

Match	Men	Women	Jr. Boys	Jr. Girls	Boys	Girls
First	10.76	12.14	20.18	34.48	10.54	12.88
Second	0.98	7.28	15.70	19.70	7.53	9.37
Third	4.89	9.71	7.85	9.85	3.77	3.51
Fourth	3.91	7.28	4.48	4.93	3.01	2.34
Total	20.55	36.41	48.21	68.97	24.85	28.10

Most injuries also occurred in the first match in junior boys ($p=0.010$), junior girls ($p=0.007$), boys ($p=0.049$) and girls ($p=0.029$).

Among the males, the juniors sustained more injuries than their older and younger counterparts in the first-third match ($p<0.001$ each) as well as the fourth ($p=0.004$). The same pattern was found among the females, with the juniors sustaining more injuries in the first ($p<0.001$), second ($p<0.001$), third ($p=0.007$) and fourth match ($p=0.050$).

When comparing males and females per match, the women recorded a higher injury rate in the first match ($p<0.001$), the third ($p=0.005$) and fourth match ($p=0.014$). In the juniors, the girls had more injuries in the first ($p<0.001$), second ($p<0.001$), third ($p=0.002$) and fourth match ($p=0.025$). Among the children, the girls also sustained more injuries in the first ($p<0.001$), second ($p<0.001$), third ($p=0.008$) and fourth match ($p=0.025$).

DISCUSSION

Although injuries were found to increase with increasing time of competition in other sports [7], this was not the case for the Greek young and adult taekwondo athletes. In fact, injuries tended to decrease with increasing time of competition in the juniors and children. It is not entirely clear why this is the case. One explanation may be that competitors vary in level of proficiency more in the earlier than later rounds. For instance, Stricevic *et al.* [6] suggested that the lower skilled athletes tended to get injured more. As time of competition increases, the better skilled athletes remain in the draw and fewer injuries occur. It is also possible that as competition nears its end, athletes are less inclined to report an injury, especially if it is not severe enough to withdraw.

The higher injury rates for the Juniors across all matches may be explained by lower athlete-exposures for both males and females. Combined with a higher frequency of injuries, the injury rate would logically also be higher. Since there was no difference in time of exposure, with all age groups competing for 3 rounds of 3 minutes per bout, concern seems warranted regarding the Juniors. Other studies have also revealed higher injury rates for Juniors [3] but none have focused on injuries by match. In addition, these studies have used smaller sample sizes. More research is definitely indicated.

The difference in injury rates between males and females in general has been reported before [1]. It was hypothesized that females may be more inclined to report an injury, hence their larger total injury rate.

However, both males and females will be inclined to report serious injuries, such as cerebral concussions and fractures [4]. The current study seems to suggest that females record higher injury rates across time of competition. Further research should assess injury rates across time for both general and serious injuries.

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